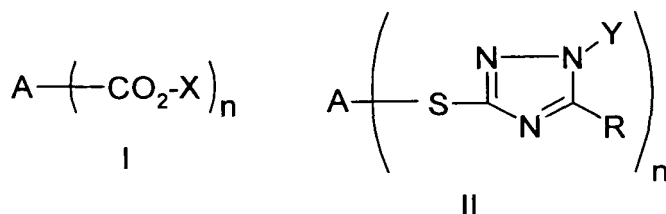


CLAIMS

We claim:

1. Photopolymerizable colorant compounds having Formulas I and II:



5

wherein

A, is a mono-, di-, tri- or tetravalent chromophore;

X is -R₁-O-Q or the photopolymerizable group -CH₂-C₆H₄-p-C(R₂)=CH₂;

10 Y is -R₁-O-Q, -CH₂-C₆H₄-p-C(R₂)=CH₂ or Q;

R is selected from hydrogen, C₁-C₆ alkyl, aryl and C₃-C₈ cycloalkyl;

R₁ is selected from C₂-C₈ alkylene, -(CH₂CH₂O)_m-CH₂CH₂- and 1,4-cyclohexylenedimethylene;

R₂ is selected from hydrogen and C₁- C₆ alkyl;

15 n is 1 to 4;

m is 1 - 3;

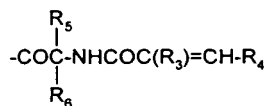
Q is a photopolymerizable group selected from an organic radical having the formula:

Ia -COC(R₃)=CH-R₄

IIa -CONHCOC(R₃)=CH-R₄

IIIa -CONH-C₁ - C₆-alkylene OCOC(R₃) =CH-R₄

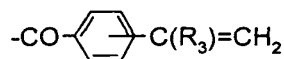
IVa



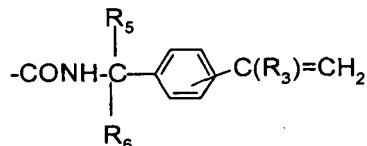
Va



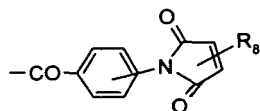
VIa



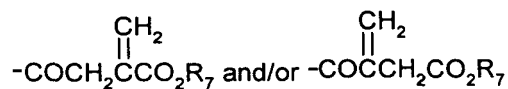
VIIa



VIIIa



IXa



wherein

R_3 is selected from hydrogen or $\text{C}_1 - \text{C}_6$ alkyl;

- R_4 is selected from hydrogen; $\text{C}_1 - \text{C}_6$ alkyl; phenyl; phenyl substituted with one or more groups selected from $\text{C}_1 - \text{C}_6$ alkyl, $\text{C}_1 - \text{C}_6$ alkoxy, $-\text{N}(\text{C}_1 - \text{C}_6 \text{ alkyl})_2$, nitro, cyano, $\text{C}_2 - \text{C}_6$ alkoxy carbonyl, $\text{C}_1 - \text{C}_6$ alkanoyloxy and halogen; 1- and 2-naphthyl; 1- and 2-naphthyl substituted with $\text{C}_1 - \text{C}_6$ alkyl or $\text{C}_1 - \text{C}_6$ alkoxy; 2- and 3-thienyl; 2- and 3-thienyl substituted with $\text{C}_1 - \text{C}_6$ alkyl or halogen; 2- and 3-furyl; and 2- and 3-furyl substituted with $\text{C}_1 - \text{C}_6$ alkyl;

R₅ and R₆ are independently selected from hydrogen, C₁ - C₆ alkyl, substituted C₁ - C₆ alkyl; aryl; or R₅ and R₆ may be combined to represent a $-(\text{-CH}_2\text{-})_{3-5}\text{-}$ radical;

5 R₇ is selected from hydrogen or a group selected from C₁ - C₆ alkyl, substituted C₁ - C₆ alkyl, C₃ - C₈ alkenyl, C₃ - C₈ cycloalkyl and aryl; and

R₈ is selected from hydrogen, C₁ - C₆ alkyl and aryl.

2. Photopolymerizable colorant compounds according to Claim 1
wherein A represents a a mono-, di-, tri- or tetravalent residue of a
10 chromophore selected from anthraquinone, anthrapyridone, anthrapyridine, anthrapyrimidine, anthrapyrimidine, isothiazoloanthrone, azo, bis-azo, methine, bis-methine, coumarin, 3-aryl-2,5-dioxypyrroline, 3-aryl-5-dicyanomethylene-2-oxypyrroline, perinone, quinophthalone, phthalocyanine, metal phthalocyanine, nitroarylamine and a
15 2,5-diarylamino-terephthalic ester residue.

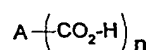
3. Photopolymerizable colorant compounds according to Claim 2
wherein X and Y, respectively, are selected from $-\text{CH}_2\text{CH}_2\text{OQ}$, $-\text{CH}_2\text{CH}(\text{CH}_3)\text{OQ}$, $-(\text{CH}_2\text{CH}_2\text{O})_{1-2}\text{-CH}_2\text{CH}_2\text{OQ}$, $-\text{CH}_2\text{C}(\text{CH}_3)_2\text{CH}_2\text{OQ}$, and
20 $-\text{CH}_2\text{-C}_6\text{H}_{10}\text{-CH}_2\text{OQ}$ and A is an anthraquinone, anthrapyridone or anthrapyridine residue or a 2,5-diarylamino-terephthalate chromophore residue.

4. Photopolymerizable colorant compounds according to Claim 2
25 wherein Q is $-\text{COCH}=\text{CH}_2$ or $-\text{COC}(\text{CH}_3)=\text{CH}_2$.

5. Photopolymerizable colorant compounds according to Claim 2
wherein X is selected from $-\text{CH}_2\text{-C}_6\text{H}_4\text{-4-C(R}_2\text{)=CH}_2$ wherein R₂ is hydrogen or methyl; and $-\text{R}_1\text{-O-Q}$ wherein R₁ is selected from $-(\text{CH}_2)_{2-4}\text{-}$,
30 $-\text{CH}_2\text{CH}(\text{CH}_3)\text{-}$, $-\text{CH}_2\text{C}(\text{CH}_3)_2\text{CH}_2\text{-}$, $-(\text{CH}_2\text{CH}_2\text{O-})_{1-2}\text{CH}_2\text{CH}_2\text{-}$,

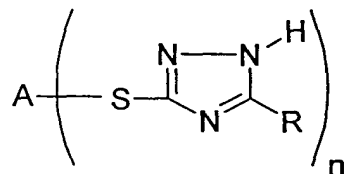
-CH₂CH(OH)CH₂-, and CH₂-C₆H₁₀-4-CH₂-; and Q is selected from
 -COC(R₃)=CH₂ wherein R₃ is hydrogen or methyl; or
 -CONHC(CH₃)₂-C₆H₄-4-C(CH₃)=CH₂.

- 5 6. Process for the preparation of the photopolymerizable colorants defined in Claim 1 having Formula I wherein X is a p-vinylbenzyl radical having the formula -CH₂-C₆H₄-p-C(R₂)=CH₂ which comprises reacting colored acidic compounds having the structure:



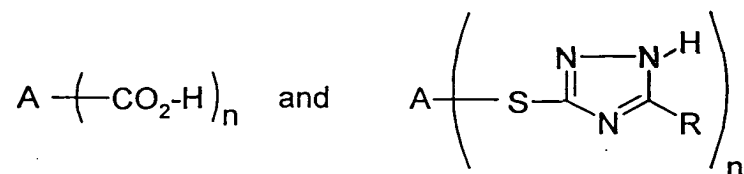
- 10 with a compound having the structure ClCH₂-C₆H₄-p-C(R₂)=CH₂ in the presence of base.

7. Process for the preparation of the photopolymerization colorants defined in Claim 1 having Formula II wherein Y is a p-vinylbenzyl radical having the formula -CH₂-C₆H₄-p-C(R₂)=CH₂ which comprises reacting colored acidic compounds having the structure



- with 4-chloromethylstyrene compounds having the structure
 20 ClCH₂-C₆H₄-p-C(R₂)=CH₂ in the presence of a base.

8. Process for the preparation of the colored photopolymerizable compounds defined in Claim 1 having Formula I and Formula II wherein X and Y are -CH₂CH₂-O-Q or -CH₂CH(CH₃)-O-Q, which comprises the steps of:
 25 (a) reacting colored acidic compounds having the structures:



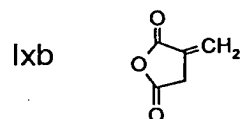
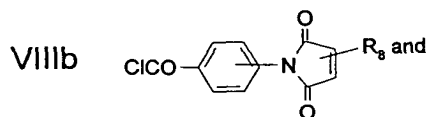
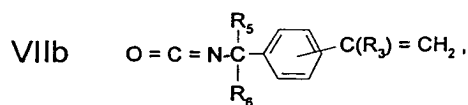
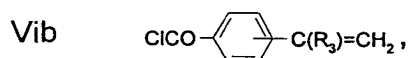
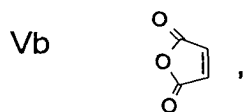
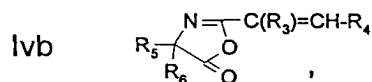
5 with at least about n molecular equivalents of ethylene or propylene carbonate for each molecular equivalent of acidic compounds to produce the 2-hydroxyalkyl derivatives of said acidic compounds;

(b) reacting said colored 2-hydroxyalkyl derivatives with about n molecular equivalents of one or more acylating agents having the structures:

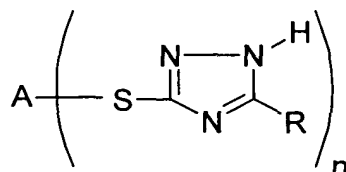
Ib $\text{ClCOC(R}_3\text{) = CH-R}_4$ or $\text{O[COC(R}_3\text{) = CH-R}_4\text{]}_2$,

IIb $\text{O=C=N-COC(R}_3\text{) = CH-R}_4$,

IIIb $\text{O=C=N-C}_1\text{-C}_6\text{ alkylene OCOC(R}_3\text{) = CH-R}_4$,



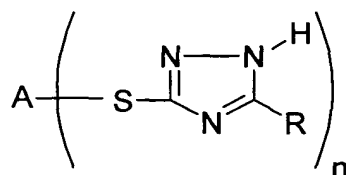
9. Process for the preparation of the colored photopolymerizable compounds defined in Claim 1 having Formula II wherein Y is a photopolymerizable group Q which comprises reacting a colored acidic compound having the structure:



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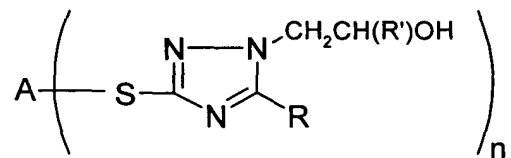
with at least about n molecular equivalents of an acylating agent selected from acylating agents Ib through IXb of Claim 7.

10. Process for the preparation of the colored photopolymerizable compounds defined in Claim 1 having Formula II wherein Y is a photopolymerizable group Q which comprises the steps of:
- (a) reacting a colored acidic triazolythio compound having the structure:



15

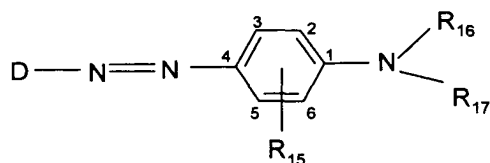
with at least about n molecular equivalents of ethylene or propylene carbonate to produce a hydroxyalkyl compound having the formula



20 wherein R' is hydrogen or methyl, and

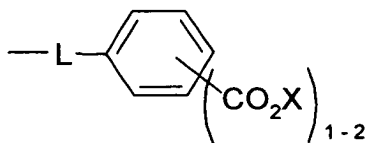
(b) reacting the hydroxyalkyl compound produced in step (a) with an acylating agent selected from acylating agents Ib through IXb of Claim 8.

- 5 11. A photopolymerizable azo colorant compound defined in Claim 5 having the formula



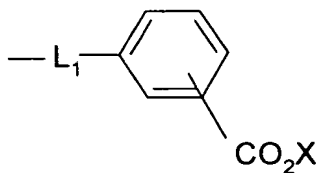
wherein

- 10 D is a diazo component selected from aryl and heteroaryl groups wherein the aryl and heteroaryl groups are unsubstituted or substituted with C₁-C₆ alkyl, C₁-C₆ alkoxy, C₁-C₆ alkylthio, halogen, C₂-C₆ alkoxy carbonyl, formyl, C₂-C₆ alkanoyl, dicyanovinyl, trifluoromethyl, cyano, carbamoyl, -CONH-C₁-C₆ alkyl, sulfamoyl, -SO₂NH-C₁-C₆ alkyl, phenylazo, 15 phenylsulfonyl, fluorosulfonyl, benzoyl, C₁-C₆ alkylsulfonyl, nitro, -CO₂X and



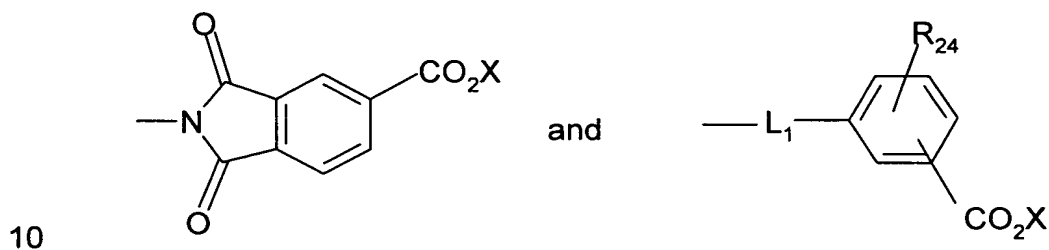
wherein L is a linking group selected from -O-, -S- and -SO₂-;

- R₁₅ is selected from hydrogen or 1 or 2 groups selected from C₁-C₆ alkyl; C₁-C₆ alkoxy; halogen; -NHCOR₂₂, -NHCO₂R₂₂, and -NHSO₂R₂₃ 20 wherein R₂₂ is selected from hydrogen, C₁-C₆ alkyl, and aryl and R₂₃ is selected from C₁-C₆ alkyl, and aryl; wherein the C₁-C₆ alkyl groups represented by R₂₂ and R₂₃ may be substituted with C₁-C₆ alkoxy, aryl, cyano, halogen, C₂-C₆ alkanoyloxy, -CO₂X or



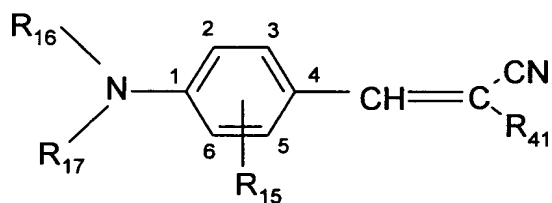
wherein L_1 is selected from a covalent bond, -O-, -S-, -SO₂-, -SO₂NH- and -CONH-;

- 5 R_{16} and R_{17} are independently selected from hydrogen, C₁-C₆ alkyl, cyclohexyl, aryl, C₁-C₆ alkyl substituted with 1 or 2 groups selected from aryl, C₁-C₆ alkoxy, cyano, -OCO-C₁-C₆-alkyl, halogen, succinimido, phthalimido, -CO₂X,



12. A photopolymerizable methine colorant compound defined in Claim 5 having the formula

15

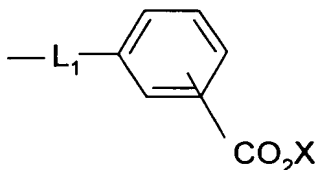


wherein

- 20 R_{15} is selected from hydrogen or 1 or 2 groups selected from C₁-C₆ alkyl; C₁-C₆ alkoxy; halogen; -NHCOR₂₂, -NHCO₂R₂₂, and -NHSO₂R₂₃

wherein R_{22} is selected from hydrogen, C_1 - C_6 alkyl, and aryl and R_{23} is selected from C_1 - C_6 alkyl and aryl; wherein the C_1 - C_6 alkyl groups represented by R_{22} and R_{23} may be substituted with C_1 - C_6 alkoxy, aryl, cyano, halogen, C_2 - C_6 alkanoyloxy, $-CO_2X$ or

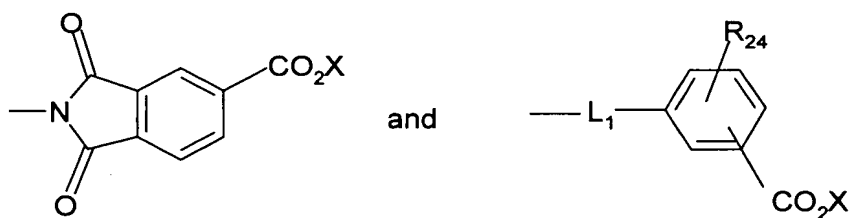
5



wherein L_1 is selected from a covalent bond, $-O-$, $-S-$, $-SO_2-$, $-SO_2NH-$ and $-CONH-$;

R_{16} and R_{17} are independently selected from hydrogen, C_1 - C_6 alkyl, cyclohexyl, aryl, C_1 - C_6 alkyl substituted with 1 or 2 groups selected from aryl, C_1 - C_6 alkoxy, cyano, $-OCO-C_1-C_6$ -alkyl, halogen, succinimido, phthalimido, $-CO_2X$,

10

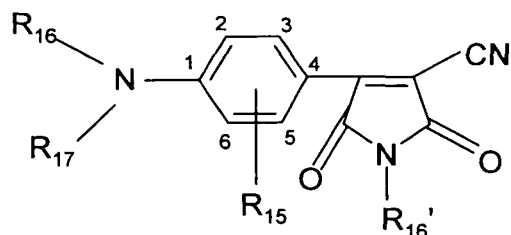


15

R_{41} is selected from cyano, $-CO_2-C_1-C_6$ -alkyl, aryl, heteroaryl, $-SO_2-C_1-C_6$ -alkyl, $-SO_2$ -aryl, and $-CO_2X$.

13. A photopolymerizable 3-aryl-2,5-dioxypyrroline colorant compound defined in Claim 5 having the formula

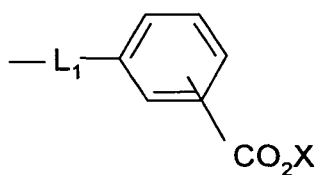
20



wherein

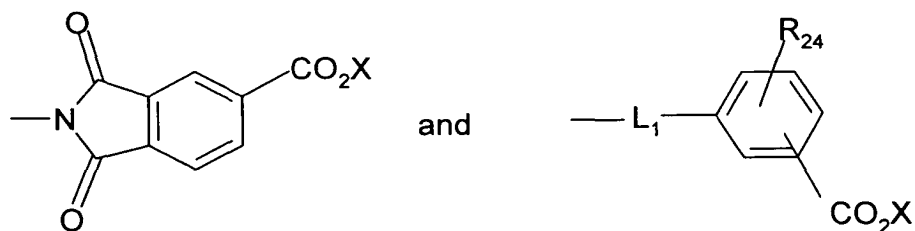
5 R_{15} is selected from hydrogen or 1 or 2 groups selected from C_1 - C_6 alkyl; C_1 - C_6 alkoxy; halogen; $-NHCOR_{22}$, $-NHCO_2R_{22}$, and $-NHSO_2R_{23}$ wherein R_{22} is selected from hydrogen, C_1 - C_6 alkyl, and aryl and R_{23} is selected from C_1 - C_6 alkyl and aryl; wherein the C_1 - C_6 alkyl groups represented by R_{22} and R_{23} may be substituted with C_1 - C_6 alkoxy, aryl, cyano, halogen, C_2 - C_6 alkanoyloxy, $-CO_2X$ or

10

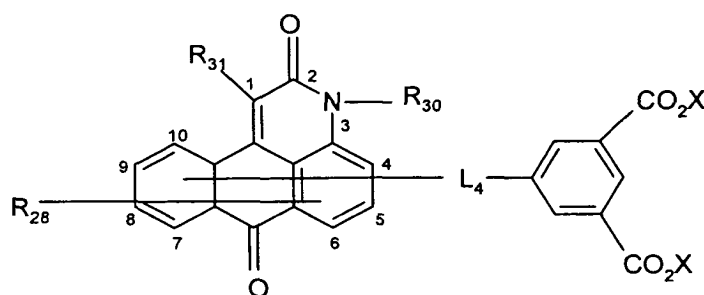


wherein L_1 is selected from a covalent bond, $-O-$, $-S-$, $-SO_2-$, $-SO_2NH-$ and $-CONH-$;

15 R_{16} , R_{16}' and R_{17} are independently selected from hydrogen, C_1 - C_6 alkyl, cyclohexyl, aryl, C_1 - C_6 alkyl substituted with 1 or 2 groups selected from aryl, C_1 - C_6 alkoxy, cyano, $-OCO-C_1$ - C_6 -alkyl, halogen, succinimido, phthalimido, $-CO_2X$,



14. A photopolymerizable anthrapyridone colorant compound defined in Claim 5 having the formula



5

wherein

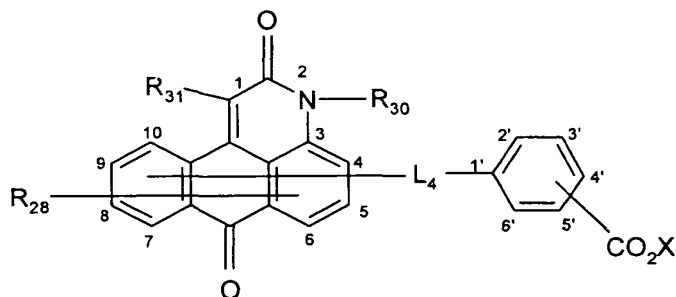
R_{28} is selected from hydrogen, 4- C_1 - C_6 alkoxy, 4-arylthio, 4-aryloxy, 4- C_1 - C_6 alkylthio, 4- C_1 - C_6 alkylsulfonyl, 4-arylsulfonyl, and 4-halogen;

10 R_{30} is selected from hydrogen, C_1 - C_8 alkyl, substituted C_1 - C_8 alkyl, and aryl;

R_{31} is selected from hydrogen, cyano, C_1 - C_6 alkoxy, C_1 - C_6 alkylthio, halogen, C_1 - C_6 alkylsulfonyl, arylsulfonyl, aryl, arylthio, heteroaryl, heteroarylthio, C_2 - C_6 alkoxy carbonyl, and aroyl; and

15 L_4 is selected from 6-NH- and 6-S-.

15. A photopolymerizable anthrapyridone colorant compound defined in Claim 5 having the formula



wherein

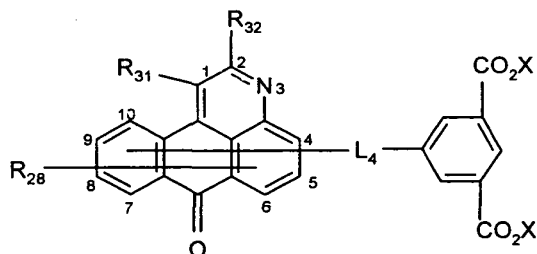
R₂₈ is selected from hydrogen, 4-C₁-C₆ alkoxy, 4-arylthio,
 5 4-heteroarylthio, 4-aryloxy, 4-C₁-C₆ alkylthio, 4-C₁-C₆ alkylsulfonyl,
 4-arylsulfonyl, and 4-halogen;

R₃₀ is selected from hydrogen, C₁-C₈ alkyl, substituted C₁-C₈ alkyl,
 and aryl;

R₃₁ is selected from hydrogen, cyano, C₁-C₆ alkoxy, C₁-C₆ alkylthio,
 10 halogen, C₁-C₆ alkylsulfonyl, arylsulfonyl, aryl, arylthio, heteroaryl,
 heteroarylthio, C₂-C₆ alkoxy carbonyl, and aroyl; and

L₄ is selected from 6-NH- and 6-S-.

16. A photopolymerizable anthrapyridine colorant compound defined in
 15 Claim 5 having the formula



wherein

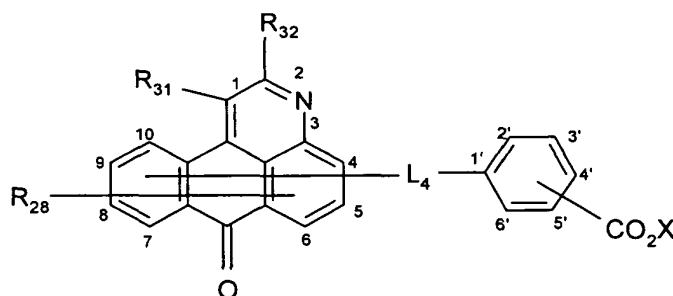
R₂₈ is selected from hydrogen, 4-C₁-C₆ alkoxy, 4-arylthio, 4-aryloxy,
 20 4-C₁-C₆ alkylthio, 4-C₁-C₆ alkylsulfonyl, 4-arylsulfonyl, and 4-halogen;

R₃₁ is cyano;

R_{32} is $-N(R_{33})R_{34}$ wherein R_{33} and R_{34} are independently selected from C_1 - C_6 alkyl, C_1 - C_6 alkyl substituted with C_2 - C_6 alkanoyloxy, C_1 - C_6 alkoxy, and aryl or $-N(R_{33})R_{34}$ collectively may be morpholino, piperidino, or pyrrolidino; and

5 L_4 is selected from 6-NH- and 6-S-.

17. A photopolymerizable anthrapyridine colorant compound defined in Claim 5 having the formula



10

wherein

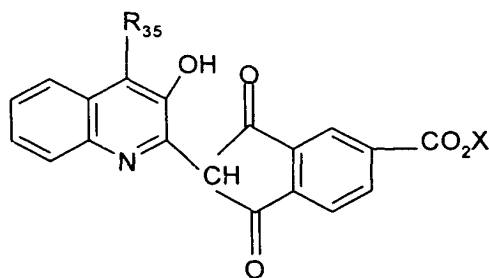
R_{28} is selected from hydrogen, 4- C_1 - C_6 alkoxy, 4-arylthio, 4-aryloxy, 4- C_1 - C_6 alkylthio, 4- C_1 - C_6 alkylsulfonyl, 4-arylsulfonyl, and 4-halogen;

15 R_{31} is cyano;

R_{32} is $-N(R_{33})R_{34}$ wherein R_{33} and R_{34} are independently selected from C_1 - C_6 alkyl, C_1 - C_6 alkyl substituted with C_2 - C_6 alkanoyloxy, C_1 - C_6 alkoxy, and aryl or $-N(R_{33})R_{34}$ collectively may be morpholino, piperidino, or pyrrolidino; and

20 L_4 is selected from 6-NH- and 6-S-.

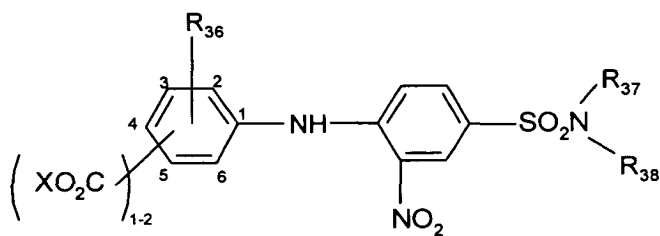
18. A photopolymerizable quinophthalone colorant compound defined in Claim 5 having the formula



wherein R_{35} is selected from hydrogen, bromo, arylthio, heteroarylthio, and arylsulfonyl.

5

19. A photopolymerizable nitroarylamine colorant compound defined in Claim 5 having the formula



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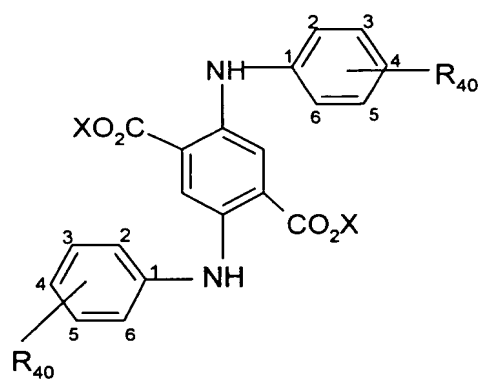
wherein

R_{36} is selected from hydrogen, C_1 - C_6 alkyl, C_1 - C_6 alkoxy, and halogen; and

R_{37} and R_{38} are independently selected from hydrogen, C_1 - C_6 alkyl, substituted C_1 - C_6 alkyl, and aryl.

15

20. A photopolymerizable 2,5-diarylaminothepthalate colorant compound defined in Claim 5 having the formula



wherein R_{40} is selected from hydrogen, C₁-C₆ alkyl, C₁-C₆ alkoxy, and halogen.